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09/855,652	05/16/2001	Keisuke Hatano	Q64500	1374

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EXAMINER

LUU, THANH X

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/855,652

Applicant(s)

HATANO ET AL.

Examiner

Thanh X Luu

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☒ Claim(s) 41-43 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 22 May 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to amendments and remarks filed May 22, 2003. Claims 1-43 are currently pending.

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on May 22, 2003 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Objections

2. Claims 41-43 are objected to because of the following informalities:

In claims 41-43, "the electrodes" and "the insulating film" lacks proper antecedent basis. That is, there are multiple electrodes and insulating films claimed, it is unclear which electrodes and insulating film the terms refer to.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. Claims 1-8, 11, 12, 15, 16, 19, 20, 25, 26, 29, 31 and 33-40, as understood, are rejected under 35 U.S.C. 102(a) as being anticipated by Applicant's Admitted Prior Art (see Figures 1 and 2A-2H), hereinafter, AAPA.

Art Unit: 2878

Regarding claims 1-8, 11, 12, 15, 16, 19, 20, 25, 26, 29, 31 and 33-40, AAPA discloses (see Figures 1 and 2A-2H) a solid-state image pickup device and method, comprising: first and second insulating films (portions of 606 or portions of 614 or selected combined portions of 606 and 614) formed on a surface of a semiconductor substrate (601), a solid-state image pickup region (to the left) having, as a charge transfer electrode, an electrically conductive material film (627) or conductive electrode material film formed on the first insulating film, and a peripheral circuit region (to the middle and right) formed on the semiconductor electrode other than in the solid-state image pickup region, a device in the peripheral circuit region being isolated from another device by means of an isolating electrode (either instance of 637) on the second insulating film, the isolating electrode being formed of the conductive material film. AAPA also discloses (see Figure 1) a gate electrode (middle instance of 637) constituting a transistor in the peripheral circuit region is formed on the first insulating film (left instance of 606 and 614) in the peripheral region, and the gate electrode is formed in the same step as that of the isolating electrode (right instance of 637; see also Figure 2E). AAPA also discloses (see Figure 1) the insulating films (thin parts of 606) have the same thickness or the second insulating film (portion of 614) is thicker than the first insulating film (portion of 606). Also, AAPA discloses (see Figure 1) the third insulating film (portion of 606) is thinner than the first insulating film and the second insulating film (portion of 614). In addition, AAPA discloses (see Figure 1) a third insulating film (third portion of 606) and a gate electrode (one instance of 637) formed on the third insulating layer, the gate electrode is formed in the same step as that of the

Art Unit: 2878

isolating electrode and of the same material film (see Figure 2E). AAPA also discloses (see Figures 1, 2B and 2C) a first diffusion layer (603) for isolating a device from another is formed on the semiconductor substrate in the solid-state image pickup region; a second diffusion layer (602) for isolating a device from another is formed on the semiconductor substrate below the isolating electrode (637) in the peripheral circuit region, the first and second diffusion layers formed in different steps. AAPA further discloses (see Figure 1) the second diffusion layer (602) is formed to be separated into at least two regions (the instances of 602) on the semiconductor substrate below the isolating electrode (637), and at least one of the regions of the second diffusion layer is connected to the isolating electrode. AAPA also disclose (see page 4, line 4 of the specification) the electrically conductive material film is formed of a polysilicon film. AAPA further discloses (see Figure 1) a fourth insulating film (610) is buried between electrodes formed of the electrically conductive material film, and a surface of the semiconductor substrate comprising the electrodes and the fourth insulating film is made generally flat. AAPA further discloses (see Figure 2A) forming the first and second insulating films (instances of 606) at the same time. AAPA also discloses forming the first insulating film (606) in the solid-state image pickup region and second and third insulating films (other instances of 606) in the peripheral circuit region, wherein the electrodes are formed at the same time as claimed.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2878

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 9, 10, 13, 14, 17, 18, 21, 22, 30, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA.

Regarding claims 9, 10 and 30, AAPA discloses (see Figures 2B-2C) forming the diffusion layers in different steps. However, it is well known in the art to combine steps in order to speed up fabrication. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to form the diffusion layers in the same step in the apparatus of AAPA to improve throughput in the fabrication process.

Regarding claims 13, 14, 17, 18 and 32, AAPA discloses (see Figure 1) the second diffusion layer (602) is formed to be separated into at least two regions (the instances of 602) on the semiconductor substrate below the isolating electrode (637), and at least one of the regions of the second diffusion layer is connected to the isolating electrode. AAPA does not specifically disclose the specific impurity levels of the diffusion layers. However, it is notoriously well known to dope diffusion layers with different levels of impurities to obtain a desired result. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the second diffusion layer with a higher impurity concentration as claimed in the apparatus of AAPA to obtain a desired response from the device.

Regarding claims 21 and 22, AAPA discloses (see Figure 1) a polysilicon material for the electrodes. AAPA do not specifically disclose a polysilicon and silicide

Art Unit: 2878

film combination. However, polysilicon and silicide combination electrodes are notoriously well known. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use such materials in the apparatus of AAPA to reduce the electrode resistance and improve detection.

7. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of Takeda et al. (U.S. Patent 5,591,963).

Regarding claims 23 and 24, AAPA disclose the claimed invention as set forth above. AAPA does not specifically disclose the material film is formed of a metal film. Takeda et al. teach (see Figure 11A and column 13, lines 15-20) a solid-state image pickup device having peripheral circuits in which the electrodes (106) comprises a metal film. Takeda et al. further recognize that the metal film helps shield the image pickup device. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a metal film in the apparatus of AAPA in view of Takeda et al. to provide better detection by shielding out unwanted radiation.

8. Claims 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of the Japanese publication of Sasaki et al. (JP 03-174772).

Regarding claims 27 and 28, AAPA disclose the claimed invention as set forth above. AAPA does not specifically disclose applying a constant voltage to the isolating electrode. Sasaki et al. teach (see translated abstract) improving detection by biasing an isolating electrode in a solid-state image pickup apparatus with a specific bias voltage. Thus, it would have been obvious to a person of ordinary skill in the art at the

Art Unit: 2878

time the invention was made to provide a constant voltage as claimed in the apparatus of AAPA in view of Sasaki et al. to improve detection as taught.

Allowable Subject Matter

9. Claims 41-43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: a method for fabricating a solid-state image pickup device as claimed, more specifically in combination with: depositing a fourth insulating layer by flowing, flattening the fourth insulation layer by heat treatment and uniformly etching the fourth insulating film to bury the film between all of the electrodes is not disclosed or made obvious by the prior art of record.

Response to Arguments

10. Applicant's arguments with respect to claim 7 have been considered but are moot in view of the new ground(s) of rejection.

11. Applicant's arguments filed May 22, 2003 claims 1-40 have been fully considered but they are not persuasive.

Regarding claims 1-28, Applicant asserts that AAPA does not disclose an isolating electrode. Applicant also asserts that the electrode (637) in no way operates to isolate the two devices. Examiner disagrees. The electrode (637) physically is located between the two devices or divides the two devices. As understood, since the

Art Unit: 2878

electrode (637) is positioned between the two devices, it serves to isolate the two devices and is thus an isolating electrode.

Regarding claims 29-40, Applicant further asserts that AAPA does not disclose a first and second diffusion layer for isolating. Examiner disagrees. AAPA clearly shows first (603) and second (602) diffusion layers that are positioned between the two devices and thus isolate the two devices as claimed.

Thus, as set forth above, this rejection is proper.


Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh X. Luu whose telephone number is (703) 305-0539. The examiner can normally be reached on Monday-Friday from 6:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta, can be reached on (703) 308-4852. The fax phone number for the organization where the application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

txl
July 17, 2003


Thanh X. Luu
Patent Examiner